

WHAT IS CLAIMED IS:

1. A method for obtaining data useful for reconstructing an image of an object, said method comprising:

performing a cone beam helical Computed Tomography (CT) scan of an object to obtain projection data from a plurality of detector rows; and

interpolating the obtained projection data to generate interpolated data along at least one curve that crosses at least two detector rows.

2. A method in accordance with Claim 1 further comprising performing a one dimensional filtering of said interpolated data along each said curve.

3. A method in accordance with Claim 1, wherein said interpolating the obtained data to generate interpolated data along at least one curve includes rebinning the obtained projection data, and further comprising ramp filtering of said interpolated data along each said curve.

4. A method in accordance with Claim 3 further comprising performing a three dimensional backprojection on the rebinned projection data to generate an image.

5. A method in accordance with Claim 3 further comprising:

un-rebinning the filtered data along each said curve to generate an un-rebinned dataset; and

performing a three dimensional backprojection on the un-rebinned dataset to generate an image.

6. A method in accordance with Claim 1, wherein said interpolating the obtained projection data comprises interpolating the obtained projection data to generate interpolated data along a plurality of curves that cross at least two detector rows such that at least two curves are nonparallel.

7. A method in accordance with Claim 1, wherein said interpolating the obtained projection data comprises interpolating the obtained projection data to generate a plurality of curves including two central curves, two exterior curves, and a plurality of intermediate curves between each central curve and a corresponding exterior curve, wherein the central curves and the intermediate curves cross at least two detector rows and the two exterior curves do not cross at least two detector rows, such that at least two central curves are parallel to each other and all the intermediate curves are non parallel each other, the two central curves, and the two exterior curves.

8. A method in accordance with Claim 7 wherein said interpolating the obtained projection data to generate at least one curve that crosses at least two detector rows comprises generating a plurality of curves in accordance with:

$$z_i = k_i R \sin(\gamma) + b_i \quad i = 0, 1, \dots, N-2, N-1,$$

where z represents a plane intersecting the detector, said detector being a cylindrical detector,

$$k_0 = k_N = 0,$$

$$k_{N/2-1} = k_{N/2} = \tan \eta_0,$$

$$k_i = \frac{N/2 - 2 - |i - N/2 + 2|}{N/2 - 2} \tan \eta_0 \quad i = 1, 2, \dots, N/2 - 3, N/2 - 2,$$

and

$$k_i = \frac{N/2 - 2 - |i - N/2 - 1|}{N/2 - 2} \tan \eta_0 \quad i = N/2 + 1, N/2 + 2, \dots, N - 3, N - 2,$$

wherein N is the number of detector rows of the cylindrical detector, and $\tan \eta_0 = (hNd)/(2\pi R)$ where h is a helical pitch, d is a detector row height, and R is a radius of the detector.

16. An apparatus in accordance with Claim 11, wherein to interpolate the obtained projection data, said apparatus is configured to interpolate the obtained projection data to generate interpolated data along a plurality of curves that cross at least two detector rows such that at least two curves are nonparallel.

17. An apparatus in accordance with Claim 11, wherein to interpolate the obtained projection data, said apparatus is configured to interpolate the obtained projection data to generate a plurality of curves including two central curves, two exterior curves, and a plurality of intermediate curves between each central curve and a corresponding exterior curve, wherein the central curves and the intermediate curves cross at least two detector rows and the two exterior curves do not cross at least two detector rows, such that at least two central curves are parallel to each other and all the intermediate curves are non parallel each other, the two central curves, and the two exterior curves.

18. An apparatus in accordance with Claim 17 wherein to interpolate the obtained projection data to generate at least one curve that crosses at least two detector rows, said apparatus is configured to generate a plurality of curves in accordance with:

$$z_i = k_i R \sin(\gamma) + b_i \quad i = 0, 1, \dots, N-2, N-1,$$

where z represents a plane intersecting said detector, which is a cylindrical detector,

$$k_0 = k_N = 0,$$

$$k_{N/2-1} = k_{N/2} = \tan \eta_0,$$

$$k_i = \frac{N/2 - 2 - |i - N/2 + 2|}{N/2 - 2} \tan \eta_0 \quad i = 1, 2, \dots, N/2 - 3, N/2 - 2,$$

and

9. A method in accordance with Claim 7 wherein said interpolating the obtained projection data comprises rebinning data using an up-sampling factor of at least 2.

10. A method in accordance with Claim 1 wherein said detector is a flat panel detector.

11. A computed tomographic (CT) imaging apparatus having a multirow detector, said imaging system configured to:

perform a cone beam helical scan of an object to obtain projection data from a plurality of detector rows; and

interpolate the obtained projection data to generate interpolated data along at least one curve that crosses at least two detector rows.

12. An apparatus in accordance with Claim 11 further configured to perform a one dimensional filtering of said interpolated data along each said curve.

13. An apparatus in accordance with Claim 11, wherein to interpolate the obtained data to generate interpolated data along at least one curve, said apparatus is configured to rebin the obtained projection data, and said apparatus is configured to ramp filter said interpolated data along each said curve.

14. An apparatus in accordance with Claim 13 further configured to perform a three dimensional backprojection on the rebinned projection data to generate an image.

15. An apparatus in accordance with Claim 13 further configured to:

un-rebin the filtered data along each said curve to generate an un-rebinned dataset; and

perform a three dimensional backprojection on the un-rebinned dataset to generate an image.

$$k_i = \frac{N/2 - 2 - |i - N/2 - 1|}{N/2 - 2} \tan \eta_0 \quad i = N/2 + 1, \quad N/2 + 2, \quad \dots \quad N - 3, \quad N - 2,$$

wherein N is the number of detector rows of the cylindrical detector, and $\tan \eta_0 = (hNd)/(2\pi R)$ where h is a helical pitch, d is a detector row height, and R is a radius of the detector.

19. An apparatus in accordance with Claim 17 wherein to interpolate the obtained projection data, said apparatus is configured to rebin data using an up-sampling factor of at least 2.

20. An apparatus in accordance with Claim 11 wherein said detector is a flat panel detector.

21. A computer-usable medium having a computer-readable program embodied thereon, said program configured to instruct a computer to interpolate projection data of a scan of an object obtained from a plurality of rows of a detector array of a cone beam helical Computed Tomography (CT) apparatus, said interpolation configured to generate interpolated data along at least one curve that crosses at least two rows of said detector array.

22. A medium in accordance with Claim 21 wherein said program is further configured to instruct the computer to perform a one dimensional filtering of said interpolated data along each said curve.

23. A medium in accordance with Claim 21, wherein to interpolate the obtained data to generate interpolated data along at least one curve, said program is configured to instruct the computer to rebin the obtained projection data, and to perform said one dimensional filtering, said program is configured to instruct the computer to ramp filter said interpolated data along each said curve.

24. A medium in accordance with Claim 23 wherein said program is further configured to instruct the computer to perform a three dimensional backprojection on the rebinned projection data to generate an image.

25. A medium in accordance with Claim 23 wherein said program is further configured to instruct the computer to:

un-rebin the filtered data along each said curve to generate an un-rebinned dataset; and

perform a three dimensional backprojection on the un-rebinned dataset to generate an image.

26. A medium in accordance with Claim 21, wherein to interpolate the obtained projection data, said program is configured to instruct a computer to interpolate the obtained projection data to generate interpolated data along a plurality of curves that cross at least two detector rows such that at least two curves are nonparallel.

27. A medium in accordance with Claim 21, wherein to interpolate the obtained projection data, said program is configured to instruct the computer to interpolate the obtained projection data to generate a plurality of curves including two central curves, two exterior curves, and a plurality of intermediate curves between each central curve and a corresponding exterior curve, wherein the central curves and the intermediate curves cross at least two detector rows and the two exterior curves do not cross at least two detector rows, such that at least two central curves are parallel to each other and all the intermediate curves are non parallel each other, the two central curves, and the two exterior curves.

28. A medium in accordance with Claim 27 wherein to interpolate the obtained projection data to generate at least one curve that crosses at least two detector rows, said program is configured to instruct the computer to generate a plurality of curves in accordance with:

139323

$$z_i = k_i R \sin(\gamma) + b_i \quad i = 0, 1, \dots, N-2, N-1,$$

where z represents a plane intersecting the detector, wherein the detector shape is cylindrical,

$$k_0 = k_N = 0,$$

$$k_{N/2-1} = k_{N/2} = \tan \eta_0,$$

$$k_i = \frac{N/2 - 2 - |i - N/2 + 2|}{N/2 - 2} \tan \eta_0 \quad i = 1, 2, \dots, N/2 - 3, N/2 - 2,$$

and

$$k_i = \frac{N/2 - 2 - |i - N/2 - 1|}{N/2 - 2} \tan \eta_0 \quad i = N/2 + 1, N/2 + 2, \dots, N - 3, N - 2,$$

wherein N is the number of detector rows of the cylindrical detector, and $\tan \eta_0 = (hNd)/(2\pi R)$ where h is a helical pitch, d is a detector row height, and R is a radius of the detector.

29. A medium in accordance with Claim 27 wherein to interpolate the obtained projection data, said program is configured to instruct the computer to rebin data using an up-sampling factor of at least 2.